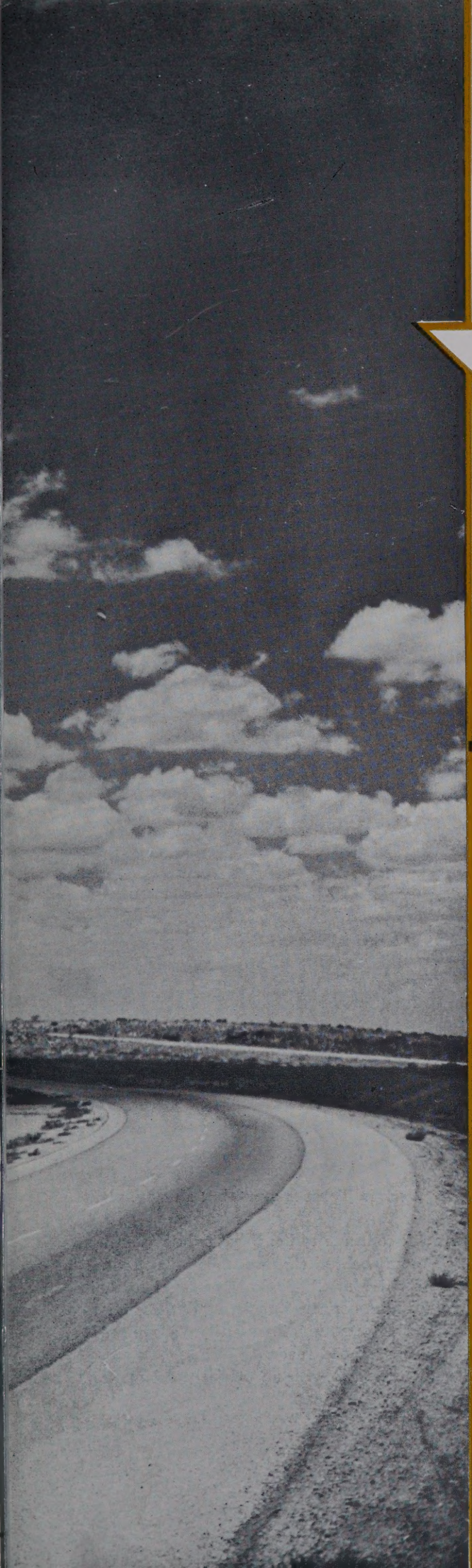
Texas Highways

July, 1961 35c



Texas Highways

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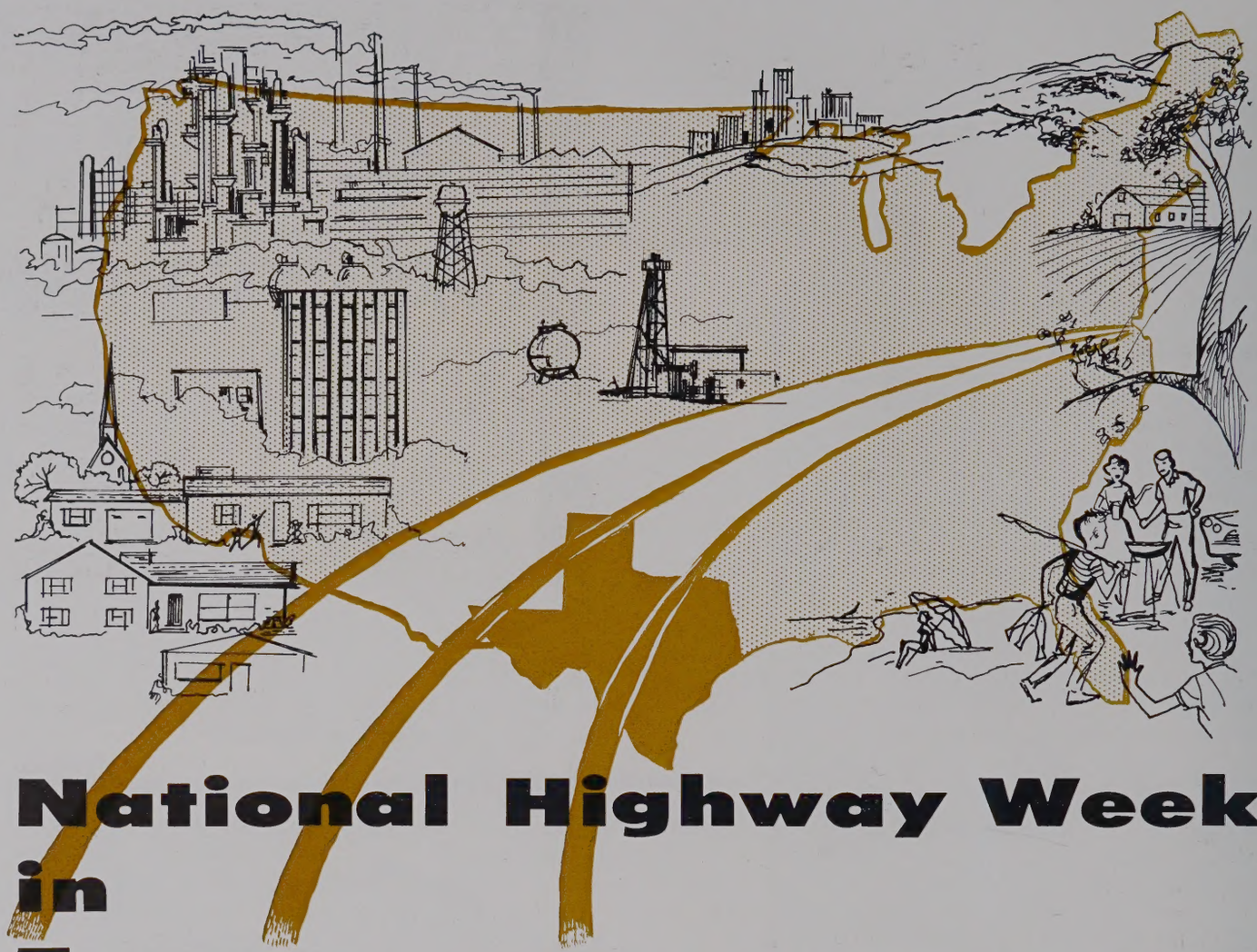


National Highway Week in Texas

✳ What was it for ?

✳ What was done in support of it ?

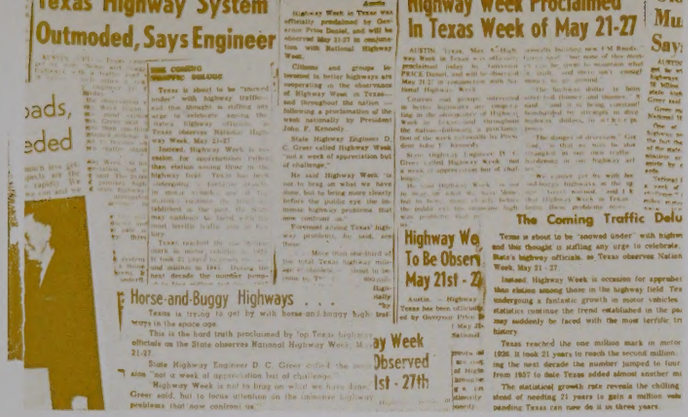
✳ What did the public --- and the press --- think about it ?

The first annual National Highway Week in Texas is over—but already, plans are underway for the next one.

The twofold purpose of this event will continue to be: focus public attention on highway needs, and rally public support behind efforts to fill those needs.

This year's Highway Week was observed May 21-27. On a national level, it was originated and jointly sponsored by the American Association of State Highway Officials and the Better Highways Information Foundation, a nonprofit organization formed to publicize the cause of good roads.

President John F. Kennedy launched the week with an official proclamation,


Texas Highway System Outmoded, Says Engineer

Highway Week Proclaimed In Texas Week of May 21-27

The Coming Traffic Delu

Horse-and-Buggy Highways . . .

HOW HIGHWAY WEEK BEGAN—Governor Price Daniel proclaimed the week of May 21-27 as "Highway Week in Texas." Citizens and groups interested in better highways observed the occasion in conjunction with National Highway Week on the same dates. From left are Governor Daniel; Fritz Thompson of Borger, President of the Texas Good Roads Association; Allen Keller of Fredericksburg, President of the Texas Highway-Heavy Branch, Associated General Contractors; and D. C. Greer, State Highway Engineer.

and the AASHO-BHIF combine worked through national news media to obtain publicity for the observance.

WHAT TEXAS DID . . .

Organize: On the state level, a BHIF chapter in Texas composed of important segments of the highway and heavy construction industry joined hands to beat the drum for National Highway Week and to bear the financial burden of the undertaking.

Publicize: These steps were taken to fix the limelight on Highway Week in Texas:

- Governor Price Daniel officially proclaimed the observance and statewide news coverage was given this event.
- Top Texas officials in the highway field addressed organizations throughout the state, appeared at press conferences and on radio and television, and made personal appearances including ribbon-cuttings at completed highway projects. All three members of the Texas Highway Commission participated: Chairman Herbert C. Petry Jr., Charles F. Hawn, and Hal Woodward, as well as State Highway Engineer D. C. Greer, Fritz Thompson, President of the Texas Good Roads Association, and others.
- Metropolitan Texas cities proclaimed Highway Week on local levels.
- A "press kit" was mailed to all Texas newspapers and received wide coverage and numerous additional editorial comments.
- Prepared spot announcements were furnished to Texas radio and television stations.
- Pictures and news stories were furnished to Texas trade publications.
- Special exhibits were prepared and used, and Highway Week bumper stickers were distributed through the Texas Highway Department Tourist Bureaus to those motorists doing extensive travel in Texas during Highway Week.

WHAT WAS THE REACTION?

The immediate and widespread favorable reaction to National Highway Week from the Texas press and individual citizens may have resulted from the unusual approach used.

In days past, a special "week" of any kind was a sure news-getter. Now, however, America is so highly organized that every week in the year is a special observance for some product or group, and little attention is paid to most of these contrived "celebrations."

The unique approach to Highway Week seemed to find favor with many Texas editors and citizens interested in good roads. The state-level BHIF chapter and other good-roads backers took their cue from the attitude expressed by State Highway Engineer D. C. Greer.

"This is not a week of appreciation, but of challenge," Greer declared in a public statement. "It is not an occasion to brag on what we have done, but to focus public attention on the immense highway problems now facing us."

Following this line of thought, good-roads supporters stressed the highway problems of Texas rather than the highway accomplishments. Emphasis was placed on these imminent crises:

- More than one-third of the total state-maintained highway mileage in Texas is obsolete, or about to become obsolete, by modern traffic standards. This is the state's 25,000-mile system of Primary Highways linking Texas

The Coming Traffic Deluge
Texans to Mark Highway Week
Price Daniel Has Proclaimed Highway Week
Highway Week In Texas Set For May 21-27
Apprehension Among Highway Offici
As Highway Week Observance Start

Willing motorists became traveling ambassadors for National Highway Week as the Texas Highway Department's Tourist Bureaus provided colorful bumper stickers for those doing extensive travel in the State during May 21-27. Travel Counselor Rosemary Williams assists a traveler in putting one of the eye-catching stickers to use.

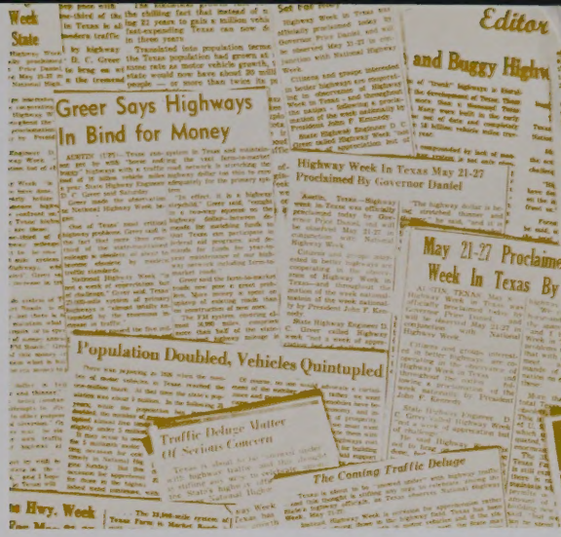
population centers and major markets. These highways are rapidly becoming unable to bear the mushrooming traffic loads imposed on them by the demands of an urbanized state.

- The mounting cost of maintenance on Farm to Market Roads is placing a serious drain on highway funds. Rigid statutory earmarkings of highway funds allow the Highway Department to build new FM Roads but do not permit the use of these funds for maintaining what is built. As a result, the Department has already reached the point where it must annually spend more on all forms of upkeep for FM Roads than on building new ones. Under present statutes, the "squeeze" on the highway dollar will get worse, not better.

Highway Commission Chairman Herbert C. Petry Jr. (center) addresses a gathering in Houston during National Highway Week. At left is State Highway Engineer D. C. Greer; at right, George Smith, Chairman of the Highway Committee of the Houston Chamber of Commerce.

- Texas is about to be "snowed under" with highway traffic if present trends of skyrocketing increase in motor vehicles continue. The state reached the one-million mark in motor vehicles in 1926. It took 21 years to reach the second million, in 1947. During the next decade the number jumped to four million and from 1957 to date Texas added another million. This growth rate reveals that Texas is now adding a million vehicles every four years. Where will all these coming vehicles be put? That was the dilemma explained during Highway Week.

The telling of the highway story in terms of these problems seemed to strike a responsive chord with many Texas newspaper editors, sparked by the manner in which the Highway Department has been administered and the quality of the highways it has produced.



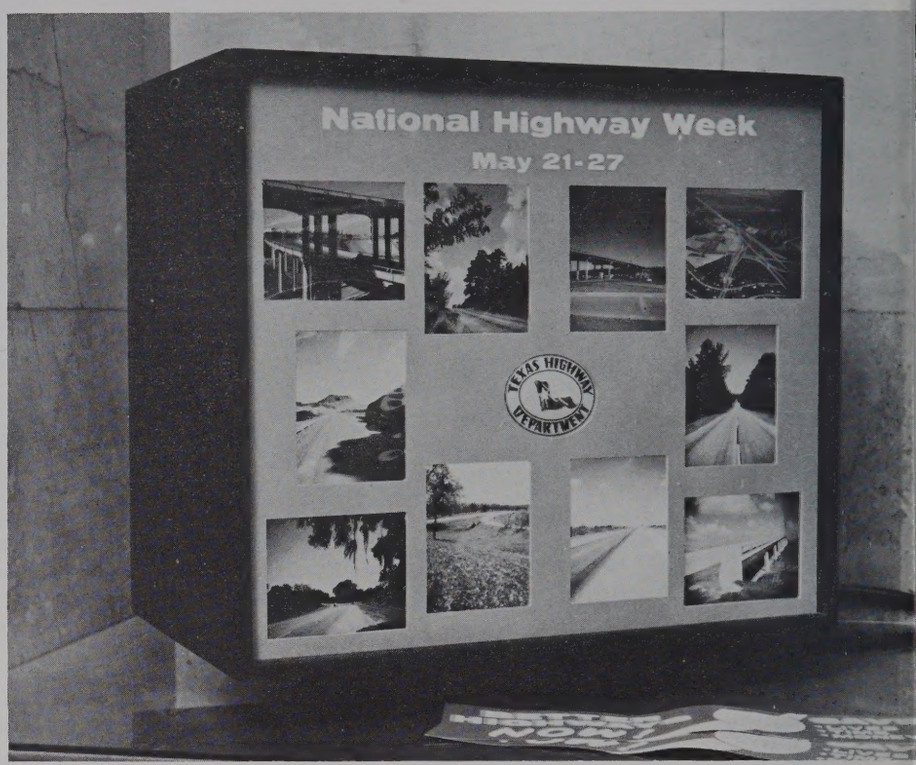
Highway Commissioner Charles F. Hawn (center) is shown in one of his television appearances during Highway Week. At left is B. L. DeBerry of Dallas, District Highway Engineer; at right, Mayor Earle Cabell of Dallas, who interviewed Hawn on the subject of better highways.

Both wire services, the Associated Press and United Press International, sent out stories on Highway Week over their state-wide wires. More than 170 newspapers in the state carried stories, and 62 newspapers carried editorials bolstering the cause of good highways. Editorial comments included these:

- from the Beeville Bee-Picayune, an editorial captioned, "WE NEED TO BACK OUR HIGHWAY DEPARTMENT." The editorial said in part, "Texas has a right to be proud of its highway department, but we must become aware of their problems and give them all needed support. It has been said that this department of our state government is the most efficient in existence . . . good highways are the lifelines of commerce, industry, and recreation. Let us keep backing our highway men in Austin and insure a program of progress."
- from the Abilene Reporter-News, an editorial captioned, "EVEN AS WE BUILD ROADS, MORE ROADS ARE NEEDED," saying that "Tremendous progress has been made on highways everywhere—and this part of the state is a good example. But more and better ones are a growing need . . . highway builders already have a problem catching up, much less getting ahead. And prospects are the problem will increase rapidly. We build roads as fast as we can and we still need more and better roads quicker."
- from the Dallas Times-Herald, "National Highway Week is in progress. In Texas it is being used to point up the need for swifter progress in gearing our highway network to modern requirements. . . . Texas' highways generally are superior to those of many other states. In no small measure, highways have contributed to our state's progress. From this we should learn that even more vigorous highway development in the age of swift travel would be a sound investment."
- from the Houston Post, ". . . since highways cost money—more than is now provided for building and maintaining them—Texans should support more State financing of thoroughfares on which to drive their cars."

Hal Woodward, Highway Commissioner, officially opens a reconstructed section of U. S. 380 at Cisco.

Special National Highway Week exhibits were prepared illustrating the different types of Texas highways and structures bridging various bodies of water.



These examples were an indication of the reaction of the Texas press to the cause of better highways. If critical attitudes prevailed among any members of the press, the criticism either remained unvoiced or could not be discovered among the hundreds of favorable stories and editorials printed.

But what was the reaction of those to whom the message of National Highway Week was being beamed? What did the ordinary man on the street (or on the highway) think about Highway Week? Actually, his reaction may remain largely a mystery at this immediate time—but it seems probable that his reaction to this year's Highway Week and those of the future will form a significant part of the way he feels toward the over-all highway program in Texas.

Highway traffic is striding ahead with seven-league boots, and highway builders are hard-pressed to keep it in sight. National Highway Week is one method by which good-roads backers hope to effectively tell the highway story to the people who pay the bill—the citizens of Texas.

This year's "Week" is now well past, but good-roads backers have their eyes on the future. They are looking ahead to 1962 with the expectation that next year's National Highway Week will be bigger and better—and with the hope that it will lead to bigger and better highways.

A summing up: shown is the cover of a special picture report on Texas activities during National Highway Week, submitted to the Better Highways Information Foundation and the American Association of State Highway Officials, co-sponsors of the week.

New BPR Chief

Lowell S. Coy, former Bureau of Public Roads Assistant Division Engineer in Austin, has returned as Division Engineer.

Coy has been serving as Division Engineer in North Carolina since 1959, and prior to that was Program and Planning Engineer and Assistant Division Engineer in Austin. He comes to Austin to replace J. M. Page.

A graduate of Purdue University in civil engineering, Coy is a native of Anderson, Indiana. He worked for five years in general contracting work before joining the Bureau of Public Roads in Austin as a junior engineer. He remained in Austin until 1959, with two exceptions—time off during World War II in which he served as a colonel with the Corps of Engineers, working on military installations. He was also in direct charge of the Overseas Lumber Depot —his work in this earned him the Legion of Merit for developing new methods for processing and handling lumber for overseas shipment.

After military service, Coy returned to Texas, but was borrowed by the Corps of Engineers in 1951 for a two-year assignment in French Morocco. There he served as civilian assistant to the District Engineer on construction of air bases.

In Austin, he was Area Engineer and District Engineer before holding the two jobs noted above.

A registered professional engineer, Coy's hobbies include hunting, fishing, boating, and building.

The Coys still own their home in Austin, so they had no housing problem when he was transferred back. They also have a lake house, which Coy built. He has also built a boat and most of the family home. Mrs. Coy, the former Maribel King, worked in Maintenance Division of the Highway Department until she was married. They have one daughter —Karen Louise—who is in high school.

Lowering Concrete Box Culvert Flowline

Cecil E. Norris, Senior Resident Engineer
District 20

The City of Port Arthur recorded 21 inches of rainfall during the month of September, 1958. Most of this rainfall occurred in a two-day period and caused serious flooding conditions north of a two-barrel, eight-by-eight-foot multiple box culvert crossing U. S. 69. It was reported that a two-foot head loss occurred during peak run-off.

There were three possible solutions to the problem of providing the required additional area:

1. Open cut U. S. 69 and either add to or replace the existing struc-

CULVERT WITH LOWERED FLOWLINE

CENTER WALL

ture with the required area.

2. Jack or tunnel through U. S. 69 with a pipe parallel and adjacent to the existing structure.

3. Break out and lower the footing of the existing structure.

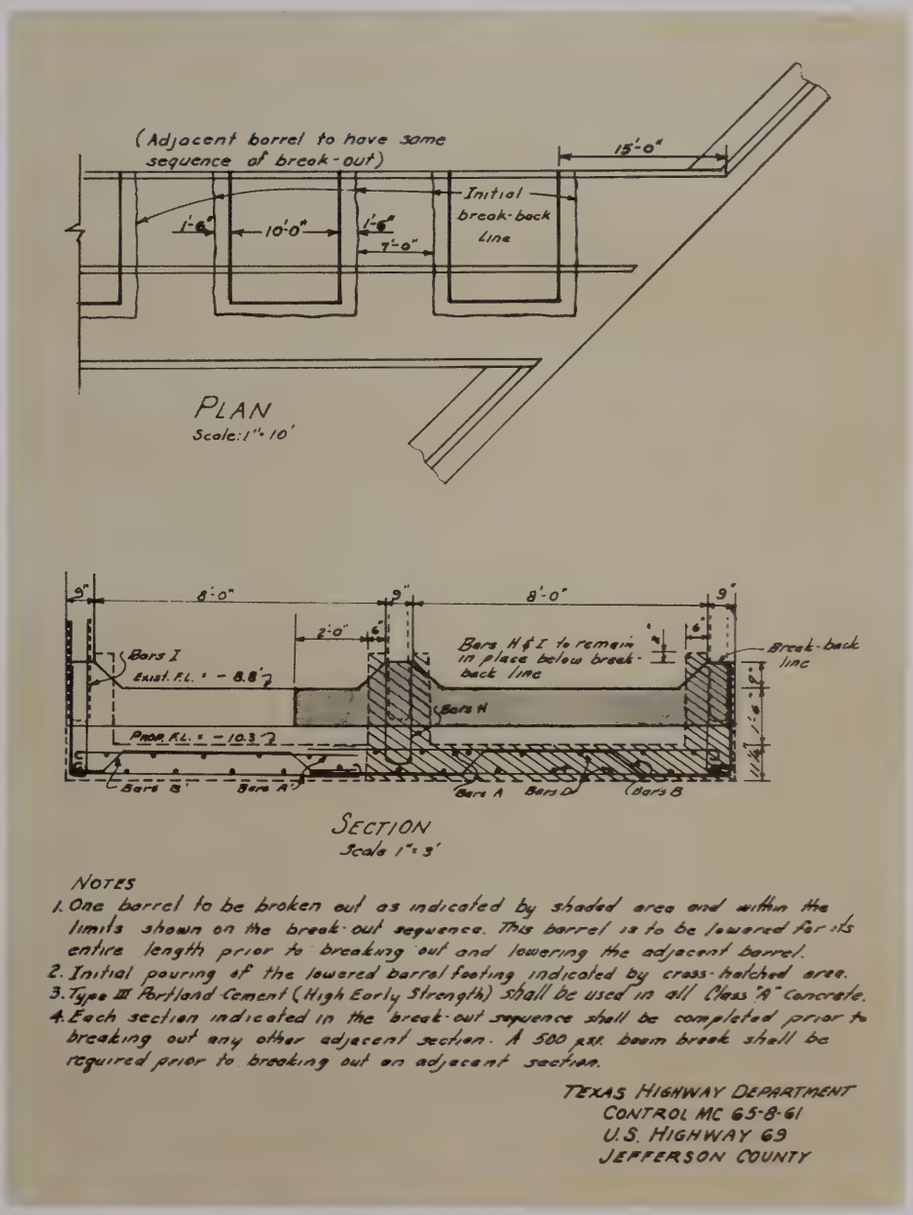
Maintaining the high volume of traffic and providing sheet piling for excavating the twelve-foot fill section over the existing structure made it prohibitive to open cut U. S. 69 from the standpoint of economics and safety to the traveling public.

Funds were authorized for State Forces to jack 72-inch-by-200-foot reinforced concrete pipe under the roadway, but it became readily apparent that due to the terrain and the size and weight of pipe they were not properly equipped to complete this project.

Bids were taken in the October, 1960, letting for jacking 72-inch-by-200-foot reinforced concrete pipe, removing and replacing headwalls on the existing structure, and providing riprap as approach end treatment. All bids were rejected on this proposal.

The last alternative was to lower the flowline of the existing structure by breaking out the footing in sections, excavating down to the required grade, and casting the new footing. It was essential that at least one side of the two-barrel, eight-by-eight-foot box remain open at all times to provide for drainage. The contractor was required to lower the footing in ten-foot alternate sections. Class III cement (high early strength) was used and flexural test beam strength of 500 p.s.i. was required before adjacent sections were broken out. The design and sequence of lowering the footing is shown in the sketch. The contract provided 45 working days to complete this project, and the contractor, W. R. Boyd, Inc., of Center, Texas, completed his operations in 39 working days.

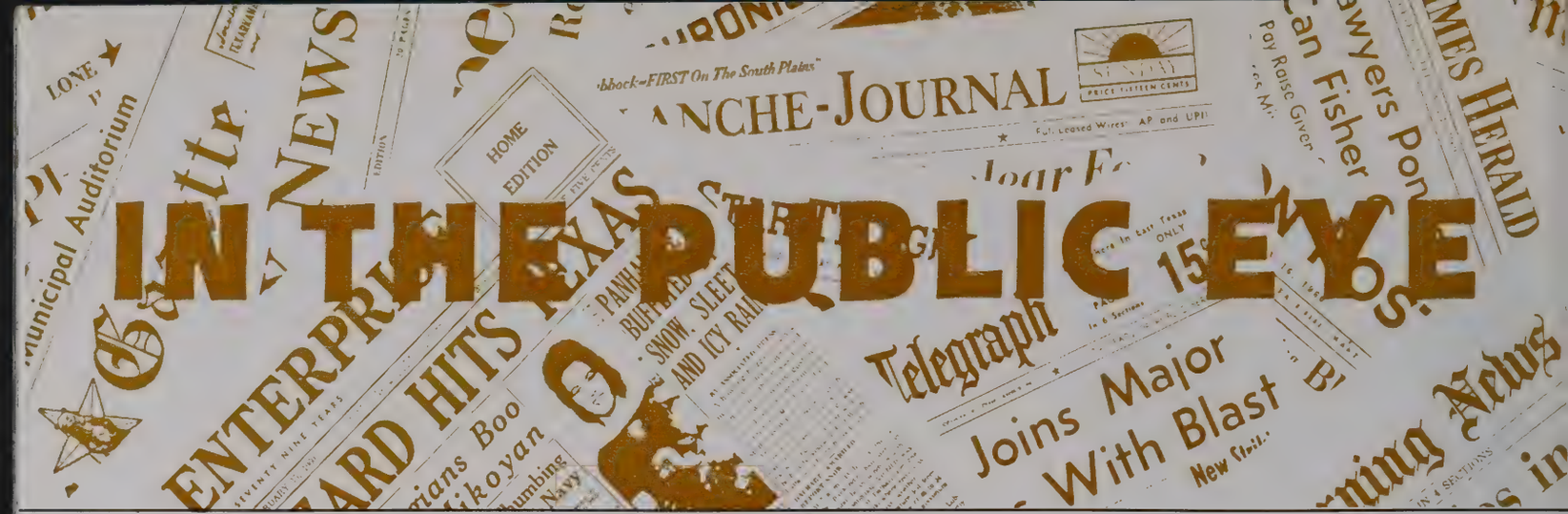
Total construction and engineering cost was $36,000, which was approximately 50 per cent less than the cost of jacking 72-inch-by-200-foot reinforced concrete pipe.



NOTES

1. One barrel to be broken out as indicated by shaded area and within the limits shown on the break-out sequence. This barrel is to be lowered for its entire length prior to breaking out and lowering the adjacent barrel.
2. Initial pouring of the lowered barrel footing indicated by cross-hatched area.
3. Type III Portland Cement (High Early Strength) shall be used in all Class "A" Concrete.
4. Each section indicated in the break-out sequence shall be completed prior to breaking out any other adjacent section. A 500 psi. beam break shall be required prior to breaking out an adjacent section.

TEXAS HIGHWAY DEPARTMENT
CONTROL MC 65-8-61
U.S. HIGHWAY 69
JEFFERSON COUNTY



LOADED HIGHWAYS

Austin Statesman, warning that—"If you hold to the opinion that driving on the nation's traffic congested highways is dangerous now, hang on to your hats.

"US weapons experts say it is possible to reduce the size and cost of Intercontinental Ballistic Missiles (ICBMs) to the point where they can be mounted on trucks. A fleet of 50,000 such units, constantly on the nation's highways, would give the country an invulnerable deterrent force, they say. The missiles would not be tied to any single launching area and thus pinpoint them as targets."

BITTERSWEET HIGHWAY

Farmersville Times, on Highway 78—"When State Highway 78 is rebuilt, if the proposed route wins approval, most of the present roadway will be used.

"Principal improvements besides a wider thoroughfare and bridges will be the elimination of bad curves and the by-passing of towns along the route."

Farmersville Times, adding editorially—"The relocations may be met with some criticism, but the Texas Highway Department, recognized as one of the best in the nation, has insisted in recent years that new roads must by-pass cities and towns.

"According to the proposed route on which a public hearing is to be held next week, Lavon, Copeville, Farmersville and Blue Ridge will be by-passed. Some residents of these towns may not like it.

"We hope there isn't too much dissent. The highway will be a real asset to the area, and we must take the bitter with the sweet."

SEE TEXAS FIRST

Commercial Recorder (San Antonio), datelined Austin—"See Texas first this summer. Texas Highway Department will help you plan a good time.

" 'Many Texans have never seen their own state through a tourist's eyes,' says State Highway Engineer D. C. Greer. They're unaware of the pleasures immediately available to them via Texas' excellent highway system.

"Highway Department will send maps and descriptive literature on points of interest and special events upon request without charge."

ROLLING OUT INTERSTATE 40

Amarillo Daily News, accompanying a photograph—"Steamroller flattens down eastbound section of U.S. Interstate Highway 40 between Adrian and the New Mexico line. The 17-mile stretch of priority federal-state highway is expected to be completed by the end of July—first in the Texas Panhandle. The construction now directly parallels Highway 66, which eventually will carry westbound traffic on four-lane Interstate 40. . . ."

UNDER THE EL

Austin American, revealing—"Since 1955, the [Texas Highway] commission has authorized cities to make parking lots out of space under elevated expressways or on highway rights of way not immediately needed for construction, provided the cities themselves operated the parking facilities.

"But Wednesday the policy was broadened also to permit such use if the cities saw fit to contract for operation of the parking areas."

WATCH IT

Dallas Morning News, under Richard Morehead's byline—"Warnings of efforts to take away highway funds at a time when they are most needed featured a Texas Good Roads Association meeting here Monday.

" 'At both federal and state levels, there seems to be a compulsive urge among some to tinker and tamper with highway funds,' said James A. Stillwell, a Houston businessman. . . . This echoed a view expressed by Hal Woodward of Coleman, member of the Texas Highway Commission. Woodward noted unsuccessful efforts . . . to divert large sums of gasoline tax money from highway purposes."

PLANNED PROGRESS

Brenham Banner-Press, announcing—"Several million dollars of highway and farm to market road construction is underway or in the planning stages in Washington County, according to Arthur L. Geick, Brenham resident engineer.

"Work is being done at present on three projects and five are planned for the future. The contract for one job in the immediate future . . . will be for a new highway from the east end of the loop to the Brazos River."

COME RAIN, COME SHINE

Semi-Weekly Light (Corsicana)—"Texas Highway Commission . . . approved engineering surveys and right-of-way purchases for $900,000 project on U.S. Highway 287 from the Trinity River west 2.5 miles to the Navarro-Freestone coun-

ty line on the road between Corsicana and Palestine, the Associated Press reported. The construction will be financed in the next available program. This will give an all-weather road on this route.

"[Chamber of Commerce highway and traffic chairman John F.] Adams told the highway commission that Highway 287 is a national highway of almost transcontinental proportion running from Yellowstone National Park in Wyoming to Beaumont on the Texas Gulf Coast and this short segment is the only stretch on the route which becomes impassable for days during times of flood conditions in the river lowlands.

"Commissioner Hawn verified this fact . . . 'You could drive out in there a way and fish right out of your car' during times when the road is under water. . . ."

Amarillo Daily News, editorially—"There should be a lot of smiles on the businessmen's faces at Vega now that the news is out about the widening of Highway 66 through the town.

"Previously there was some concern that a new highway would bypass the business section of town and thereby creating many financial problems."

TWO FOR THE SHOW

San Augustine Tribune, in discussing dedication of a State Highway 21 section from San Augustine's city limits to Fords Corner—"Also to appear on the program will be J. M. York, Lufkin District State Highway Engineer and Mr. Kenneth Collinsworth, Senior Landscape Architect of the Texas Highway Department in Austin. Mr. Collinsworth will talk to the people about the beautification along Texas' highway system."

77 SUNSHINE STRIP

San Benito News, about businessmen forming an association to push commercial development along Highway 77 between San Benito and Harlingen and thus divert Expressway traffic past their businesses—"Signs measuring 12 by 48 feet are going up in three locations—south of San Benito at the Highway 83 and 77 junction, along Highway 77 at Raymondville and at the junction of 83 and 77 west of Harlingen. These signs will be aimed at pulling traffic off the Expressway down '77 Sunshine Strip' as the highway between the cities has been dubbed."

HOW THEY KNOW

San Angelo Standard-Times, letting R. N. (Al) Jennings, maintenance supervisor, explain how the Department knows where to paint yellow stripes on highways—". . . the determining process requires a wire 1,000 feet long, two autos, two drivers and a bucket of paint.

"Ends of the wire are tied to the bumpers of the autos. The wire is spread out and the two highway employes drive at the same speed.

"When the driver in the auto in the rear cannot see the car ahead, he makes a splotch on the highway with the paint. When he can again see the car ahead, he makes another splotch.

"Later, highway department crew paints the yellow strip between the two splotches."

ONE EACH WAY

Austin Statesman, saying—"District Highway Engineer Ed Bluestein predicted . . . a construction start by the end of this year on a new Colorado River bridge at the Montopolis crossing in Austin.

"The new three-lane Montopolis river crossing will go 300 feet downstream from the present two-lane bridge. The old bridge will be kept in service to provide a pair of parallel one-way crossings.

"Bluestein estimates the new Montopolis bridge can be completed in a year, possibly by the end of 1962. The total project with its interchanges and grade separations would take two or three years, he said."

ROAD TO RECOVERY

Sherman Democrat, noting—"For the second time since he took office, President Kennedy has released funds for interstate highway construction far ahead of time to speed the work. Last February 2, he released $718 million due April 1 and last week he released $818 million due for the first quarter of fiscal 1962, beginning July 1.

". . . Release of $1,536 million from six to eight weeks ahead of due dates enables the states to put men to work to help relieve unemployment. Its use now is critical to the recovery."

UP TO PAR

Houston Post, pointing out that $5 million will be needed to properly mark Houston's city streets and urban expressways—"By far the greatest expenditure will be made by the State of Texas in bringing Houston's 115-120 miles of freeways up to interstate standards for directional signs.

"Dale Marvel, traffic engineer for the State Highway Department, says the cost of erecting these signs will run $40,000 a mile, a total of something over $4.5 million. And this is only the beginning, for maintenance costs on some of the installations will run high.

"Not a little of this cost is chargeable to vandalism, Marvel says.

"Joy riders, mainly teen-agers in convertibles, contribute heavily to the cost by throwing objects at signs, Marvel explains."

SHORT CUTS

Kilgore News Herald, covering a speech to the Highway 31 Association in Corsicana—"Charles F. Hawn of Athens . . . said State 31 is an important connecting link between Interstate Highway 20 at the Kilgore-Longview intersection and with Interstate 35 at Waco. 'It allows travelers from the east going to South Texas and Mexico to turn off Interstate 20 onto State 31 and cut straight through to Interstate 35 without having to go through the metropolitan Dallas area . . . State 31 allows people coming from the south to cut through Waco to the Kilgore-Longview area and to the east by a shorter route.'"

The Equipment and Procurement Division has issued a new booklet dealing with Tire and Equipment Preventive Maintenance. Intended as an operator's handbook, there are chapters on (1) General Equipment Maintenance, (2) Lubrication, (3) Inspection, (4) Tire Data, (5) Battery Care, and (6) Safety in Equipment Operation.

While specific operator training is a function of the districts, D-4 has outlined broad general recommendations on driver responsibility and equipment preventive maintenance in this new publication. Uniform general policies are set up that may be used as a guide for Maintenance Superintendents, Equipment Supervisors, Maintenance Foremen, and Operators alike.

In the words of John B. Nations, Director of Equipment and Procurement: "This new booklet can well serve as a reference source for everyone concerned with maintenance of Highway Department equipment. D-4 is already working closely with the districts in a program of improvement in maintenance warehouse facilities such as hydraulic lifts, compressors, tire tools, and lubrication equipment. We think it is just good business to help furnish the necessary tools with which to effect a sound equipment preventive maintenance program. Actually, you might say that we are slightly mercenary in this respect, because we are firmly convinced that improved preventive maintenance is a direct road toward reduction of new equipment purchases, depreciation losses, and cost of repairs and parts. We are confident that by the end of our next fiscal year our goal of a 10 per cent reduction in total equipment expense will be achieved. We know that this can be done when every Highway Department employee concerned becomes more equipment conscious."

Engineering data on every type of tire used in highway maintenance is a part of this new handbook; information on tire recapping, battery care, and special lubrication points on equipment is also furnished. Good and bad equipment-operation practices are pointed out, and suggested equipment-inspection schedules are outlined. The importance of regular rotation and proper dual-matching of tires, wheel balancing, wheel alignment, correction of mechanical irregularities, and daily driver checks on equipment are all given consideration in the recommendations D-4 has set forth. According to Jim Spires, Senior Equipment Analyst in D-4, a number of our District Equipment Supervisors, after a preview of the first draft, have expressed the opinion that this booklet will fill a long-felt need for a reference guide for our equipment operators in the Districts.

Transitions from Undivided to Divided Sections of Highways*

Phillip L. Wilson, Senior Designing Engineer
Highway Design Division

The topic which I have chosen, "Transitions from Undivided to Divided Sections of Highways," is certainly not a new subject to anyone familiar with the design and construction of our widespread highway system. It would be difficult to estimate the number of such transitions which have been utilized state-wide. It is obvious, however, that a number of different designs have been developed in different sections of the state, and it is toward this variance in practice that my remarks are primarily directed.

Transitioning from a two-lane to a four-lane highway is not restricted to our new, high-volume, controlled-access facilities. It has been utilized throughout the years as a safe and effective means whereby turning traffic can pause within the intersection area without impeding the flow of through traffic. In addition to regulating the flow of traffic through the intersection, the introduction of a median on the approaches to an intersecting road tends to alert the drivers to the cross-road ahead. This visual means is particularly effective at night, since visibility ahead is severely restricted by the short-range illumination of each driver's headlights. It also follows, however, that selection of the proper design for introducing a median is of greater importance under restrictive nighttime visibility than it would be during daylight hours.

As we approach the point where our existing two-lane highways will be interspersed with completed segments of divided highways, as in the case of our Interstate Highway System, it becomes even more imperative that some definite criteria for transition lengths be developed. The need

*Presented at 1961 Highway Short Course.

TABLE 1

LENGTHS OF REVERSE CURVES FOR EFFECTING WIDENING AT INTERSECTIONS

LATERAL OFFSET, (feet)	LENGTH OF REVERSE CURVE, IN FEET, WHEN RADIUS OR DEGREE OF CURVE IS:				
	R=11,460' D=0°30'	R=7640' D=0°45'	R=5730' D=1°00'	R=3820' D=1°30'	R=2865' D=2°00'
4	428	350	306	247	214
6	524	428	371	306	262
8	606	494	428	350	303
10	677	553	479	391	338
12	742	606	524	428	371
14	801	654	566	462	400
16	856	699	605	495	428
18	908	741	642	524	454
20	957	782	677	552	478
30	1172	957	829	676	585
40	1353	1105	957	781	676
50	1513	1235	1069	873	755

a roadway is increased from a two-lane section into a multi-lane divided section; the alignment should be such that the proper paths to follow are unmistakably evident to the average driver. To achieve this result, no appreciable effort in steering or reduction in speed should be introduced by the transition. On tangent alignment, widening may produce some appearance of distortion, even when flat curves are used. It is often necessary to resort to the use of reverse curves to achieve the necessary separation of traffic lanes when widening on tangent alignment. The American Association of State Highway Officials' "Policy on Geometric Design of Rural Highways" stipulates that necessary reversals in curvature should preferably be of one degree or less in rural areas,

for such specific information becomes increasingly greater when we consider that stage construction will entail the use of transitions at increased freqencies within any given portion of our existing highways.

Another condition where transitions will be increasingly utilized would be at bridge or overpass locations which are presently served by a restrictive-width structure that must either be reconstructed or replaced in order to safely serve traffic. In some instances, it is more economical to build a new structure, adjacent to the old, and permit both structures to individually serve one direction of traffic. Such a design has been satisfactorily applied in a number of cases where the old structure can safely serve one direction of traffic for a number of years but could be widened to accommodate two-direction traffic only at great expense.

In all the cases previously noted, the safe and expeditious operation of traffic within a four-lane portion can be realized only if a safe transition on the approaches is incorporated. When

TABLE 2

TRANSITIONS FROM UNDIVIDED TO DIVIDED HIGHWAYS

OFFSET (feet)	DESIGN SPEED 40	DESIGN SPEED 50	DESIGN SPEED 60	DESIGN SPEED 70
1	100	100	100	110
2	100	100	130	160
3	100	120	160	200
4	100	140	180	230
5	110	150	200	260
6	120	170	220	280
7	130	180	240	300
8	140	200	250	320
9	150	210	270	340
10	160	220	280	360
11	170	230	300	380
12	170	240	310	400
13	180	250	320	410
14	190	260	340	430
15	200	270	350	440
16	200	280	360	460
17	210	290	370	470
18	220	290	380	490
19	220	300	390	500
20	230	310	400	510
30	280	380	490	630
40	330	440	570	720
50	360	490	630	810
60	400	540	690	890
70	430	580	750	960
80	460	620	800	1020
90	490	660	850	1090
100	520	690	900	1150

where speeds are generally high, and that sharper curves may be used on low-speed roads; however, the degree of curvature, even where lower speeds are encountered, should preferably not exceed one and one-half or two degrees. The required length of reverse curvature for transitions utilizing two degrees or less are set forth in Table 1. It should be noted that the lateral offset indicated is that along one edge of pavement for either one-half or the whole median width as determined by the alignment of the adjacent highway sections. You will also note that Table 1 does not specify the design speed which would govern selection of a particular reverse curvature.

A study of Departmental publications indicates that the only definite designation of transition lengths which has been established by our Department exists in the Texas "Manual on Uniform Traffic Control Devices for Streets and Highways." Table No. D-3 which appears in this manual is shown as Table 2. The range in reverse curvature offered by this table varies from approximately 0 degrees, 45 minutes for 70 m.p.h. speed to approximately 4 degrees, 15 minutes for 40 m.p.h. speed. The maximum curvature, of course, exceeds that recommended by the American Association of State Highway Officials. It should be stressed that Table No. D-3 does not exceed the limits of safe-side friction or superelevation; however, a conscious effort in steering would be required within the lower speed ranges.

A study of criteria utilized by several other state highway departments reveals that a number of different transition lengths are utilized throughout the nation. In Table 3 the approximate lengths of taper furnished by Tables 1 and 2 are shown. The rates of taper indicated are necessarily an average range, since design speed and lateral offset will result in an extreme range of values when determined individually for each case. The California Division of Highways stipulates that a minimum transition of 350 feet be used in narrowing from two lanes to one lane or expanding one lane into two lanes. This length would result in a taper of approximately 30 longitudinal feet for one foot of offset. California further specifies that the alignment and radius of curve will vary depending upon median widths and other local considerations.

The Massachusetts Department of Public Works stipulates that a transition length of 1,500 feet is desirable to effect a narrowing of one-lane width at a design speed of 70 m.p.h., and a transition length of 1,200 feet is desirable for narrowing one-lane width at a design speed of 50 m.p.h.

From data available, it appears that the Illinois Division of Highways uses the transition lengths recommended by AASHO as previously shown in Table 1.

As demonstrated by the foregoing discussion, the nominal rate of taper utilized by these representative highway departments offers a widely diversified range in designs; however, it should also be noted that, as a general rule, all of these agencies employ a longer transition length than does our Department and that their approximate lengths of required taper either correspond to or exceed the values set forth by AASHO. It is believed that the stipulation of a standard rate of taper as used by several agencies would not appear to be a desirable practice because, for example, a 50:1 taper would result in a length of 2,400 feet if a lateral offset of 48 feet, our usual median width, were required. Such a length is, of course, definitely unwarranted. Therefore, a sliding-scale type of length designation, as afforded by the use of reverse curvature, would be far more applicable.

As previously noted, the values set forth by AASHO do not specifically refer to a given design speed; however, by applying the restrictions recomended by their organization, where high-speed traffic would be limited to approximately one degree of reverse curvature and lower-speed traffic would be limited to approximately

TABLE 3

DESIGN AGENCY	APPROXIMATE LENGTH OF TAPER IN LENGTH (FEET) PER FOOT OF OFFSET*
Texas Highway Department	From 14:1 To 30:1
American Association of State Highway Officials	From 30:1** To 60:1
California Division of Highways	30:1
Massachusetts Department of Public Works	From 100:1 To 125:1

*All values predicated on a narrowing of one lane width.

**Values shown are predicated on a degree of curvature of 1°00'. Other curvature will give either higher or lower ratios depending upon the rate of curvature.

two-degree reverse curvature, the values set forth in Table 1 can be grouped under speed classifications.

Rather than specifying only one particular rate of curvature for each design speed, a more effective guide could be achieved by stipulating minimum and desirable degrees of curvature for each speed. Thus, a certain degree of flexibility will result. In those cases where a necessary transition will be relatively temporary in nature, the minimum curvature could be used. Conversely, for permanent or semipermanent transitions, the desirable lengths should be adopted.

The lengths stipulated in Table 4 are approximately one-half the length arbitrarily specified by the State of Massachusetts. As shown by Table 5, the appropriate values set forth by Table 2 (as appearing in our Maintenance Manual) would be increased somewhat by the minimum lengths specified in the AASHO table as modified to include design speed.

The Operations Division has compiled a book entitled "Table of Tangent Offsets," which is of benefit in determining required lengths of transition for a specific offset and degree of curvature. I am sure that copies of this publication could be obtained by addressing your requests to their Division.

TABLE 4

TRANSITIONS FROM UNDIVIDED TO DIVIDED HIGHWAYS

LATERAL OFFSET (Feet)	LENGTH OF TRANSITION IN FEET FOR DESIGN SPEEDS OF: 40 m.p.h. D=2°30'		40 m.p.h. D=1°30'		50 m.p.h. D=2°00'		50 m.p.h. D=1°00'		60 m.p.h. D=1°30'		60 m.p.h. D=0°45'		70 m.p.h. D=1°00'		70 m.p.h. D=0°30'	
	Min.		Des.		Min.		Des.		Min.		Des.		Min.		Des.	
4	190		250		210		300		250		350		300		430	
6	230		300		260		370		300		430		370		520	
8	270		350		300		430		350		500		430		610	
10	300		390		340		480		390		550		480		680	
12	330		430		370		520		430		610		520		740	
14	360		460		400		570		460		650		570		800	
16	380		500		430		610		500		700		610		860	
18	410		520		450		640		520		740		640		910	
20	430		550		480		680		550		780		680		960	
30	520		680		590		830		680		960		830		1170	
40	600		780		680		960		780		1110		960		1350	
50	670		870		760		1070		870		1240		1070		1510	

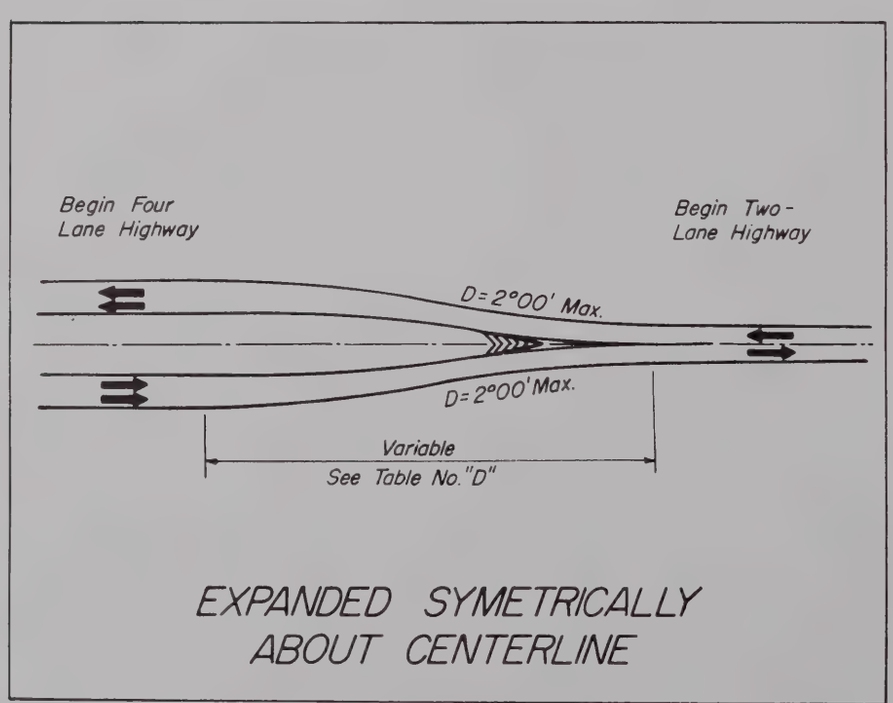


Figure 1

As discussed in the foregoing analysis, the length and degree of curvature of a transition are important considerations in its design; however, the alignment and constituent geometric features are also of paramount importance. As previously noted, the alignment should be such that no appreciable effort in selecting and negotiating the proper path should be introduced. This is particularly true when split-second decisions could result in hazardous high-speed conflicts. It is imperative that the transition be designed so that high-speed traffic is directed away from other opposing high-speed traffic, thus insuring that mistakes or confusion will not create a head-on collision.

There are two general means whereby two lanes are transitioned into four lanes. The pavement in each direction of travel may be bowed out, more or less symmetrically about the centerline, or widening may be effected by retaining the existing two-lane facility for one direction of traf-

TABLE 5

COMPARISON OF TABLE 2 (T.H.D. MAINTENANCE MANUAL) VS. TABLE 4 (AASHO REVISED)

OFFSET (Feet)	40 m.p.h.		50 m.p.h		60 m.p.h.		70 m.ph.	
	THD	*AASHO	THD	*AASHO	THD	*AASHO	THD	*AASHO
4	100	190	140	210	180	250	230	300
6	120	230	170	260	220	300	280	370
8	140	270	200	300	250	350	320	430
10	160	300	220	340	280	390	360	480
12	170	330	240	370	310	430	400	520
14	190	360	260	400	340	460	430	570
16	200	380	280	430	360	500	460	610
18	220	410	290	450	380	520	490	640
20	230	430	310	480	400	550	510	680
30	280	520	380	590	490	680	630	830
40	330	600	440	680	570	780	720	960
50	360	670	490	760	630	870	810	1070

*Minimum transition length.

fic and constructing two additional lanes either on the right or left of the existing highway to serve the other direction of traffic. The latter arrangement is usual practice where the two-lane highway beyond the four-lane portion will ultimately be converted to a divided highway with the pavement tangent being a permanent part of the ultimate development.

Whenever it is necessary to expand an existing facility symmetrically about the centerline (see Figure 1) it is mandatory that adequate approach sight distance and warning signs be incorporated into the design. In addition, an appropriate no-passing distance on the approaches to the transition must be established in order to insure that wrong-way entry of vehicles is avoided. Where ideal conditions cannot be met, it is advisable to provide two traffic lanes for vehicles entering the transition and one lane for those leaving the divided section. In this way, ample width is provided to insure entry of traffic into the proper path.

If the original highway is to serve as a future extension of the ultimate divided highway, an alignment similar to that shown in Figure 2 is the most desirable arrangement since traffic entering the transition can continue in its normal path without being forced to negotiate a reverse curve. Traffic leaving the divided section is warped in toward the existing highway. As can be seen, anyone failing to negotiate the reverse curve will simply continue onward in the direction of the future extension and thereby avoid colliding with oncoming traffic.

There are a number of different designs that can be utilized in the vicinity of the actual transition, depending upon topographical limitations at each particular point; however, the basic feature which should be incorporated is the provision of two lanes for traffic approaching the transition and one lane for traffic leaving the divided portion. The necessity for such a provision is predicated on the fact that drivers approaching a divided highway are anxious to pass cars ahead at the earliest opportunity, whereas drivers leaving the divided portion have had passing opportunities and should be more alert to the narrowing of the highway through the advance warning signs and physical constriction of the roadway to

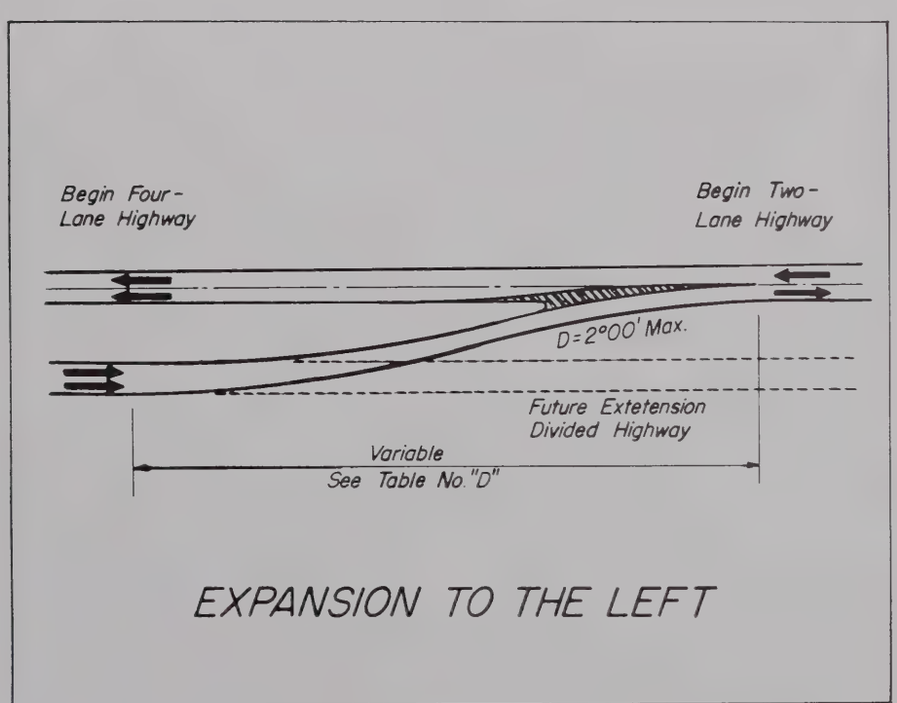


Figure 2

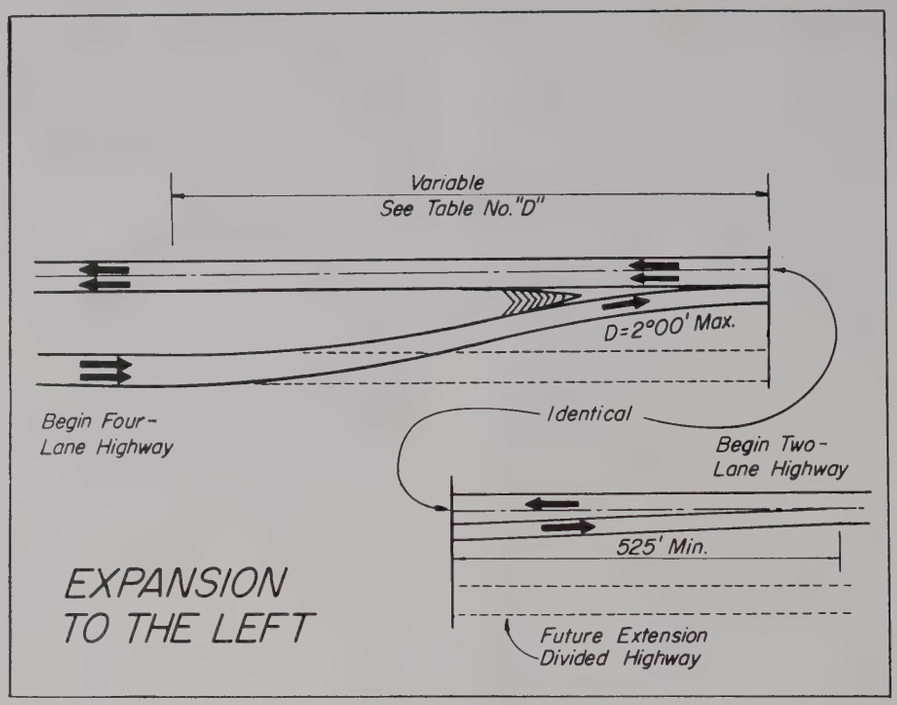


Figure 3

one-lane flow. By providing the two-lane approach to the transition, traffic should have no difficulty in entering the transition in the proper path even if they are illegally in the process of passing.

You will note that in Figure 3, a wider highway section at the point of divergence is indicated and that a longer taper for traffic is provided. This design represents an improvement over that shown in the preceding slide; however, unless sight restriction or other topographic features would require such a treatment, this design may be too elaborate for temporary connections.

If the existing roadway is to be eventually utilized for directional flow opposite from that shown on Figure 3, an alignment similar to that indicated on Figure 4 will be required. As you will note, traffic on the two-lane roadway approaching the transition is directed straight toward the reverse flow within the expanded section, thereby immeasurably increasing the possibility of wrong-way entry and resultant head-on collisions. If at all possible, such an alignment should be avoided; however, if an arrangement similar to that shown must be used, delineation, and channelization should be amply provided to insure safe operation.

Whatever alignment and curvature are chosen for a particular transition, its operation under traffic is markedly affected by the proper or improper provision of signs and pavement marking. The driver approaching a transition from either direction should be amply forewarned that the highway widens or narrows directly ahead. Upon encountering the actual transition, regulatory signs indicating the proper path to follow, along with pavement marking and channelization, should be appropriately employed. Above all, each transition is an independent roadway feature and should be designed as such. The general precepts that I have discussed today should be considered in determining the most desirable design. To achieve the best possible design, commensurate with conditions present at each location, each transition should be considered a separate and distinct problem much as each highway intersection is considered an individual study.

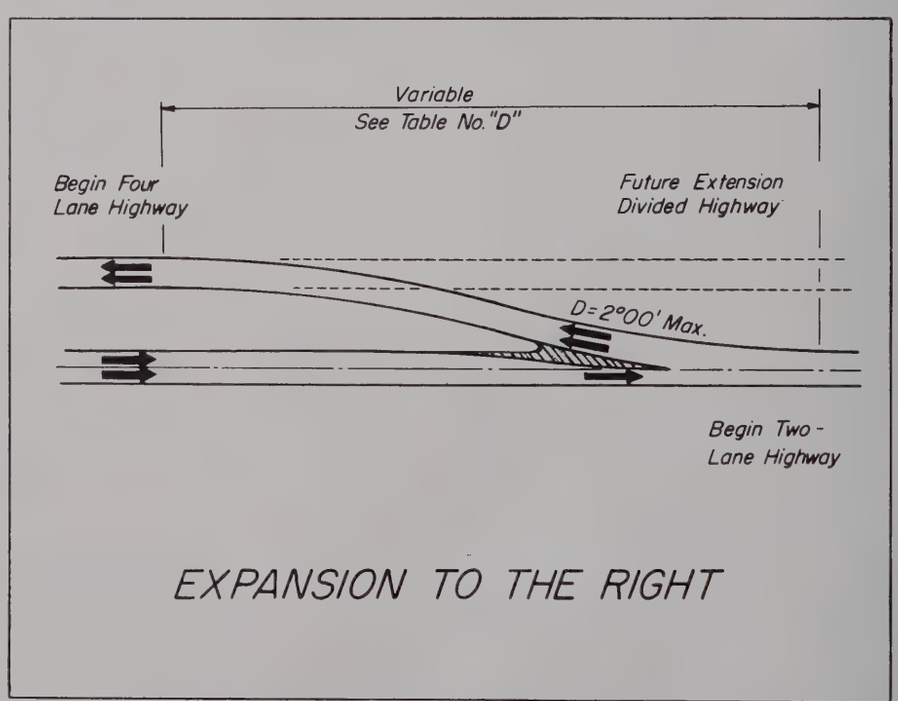


Figure 4

from ROW

Negotiator's Manual Popular

It's nationally advertised now, the advice given right of way negotiators of the Texas Highway Department. This widespread focus of attention started in TEXAS HIGHWAYS.

In February this magazine announced release of the *Manual for Negotiators,* a publication unique in the right of way world which the Right of Way Division has authored. The item caught the attention of BETTER ROADS, and it reprinted pictures used by TEXAS HIGHWAYS and quoted freely from the *Manual,* particularly from a section describing personal qualifications the Texas Highway Department expects of its negotiators. Promptly a deluge of requests filled D-15's mailbox.

Letters were postmarked from anywhere in the United States—and beyond, as far away as Australia. Copies were ordered by road commissioners, surveyors, county and consulting engineers, college professors, public relations organizations, attorneys, county judges. The places they reside: Russiaville in Indiana, Hopkins in Minnesota; Burlington, Wisconsin; Pierre, South Dakota; Juneau, Alaska; several cities in Canada. Personnel in highway departments from far and wide also have written for copies—Wyoming, Rhode Island, New Mexico, New York, Missouri, Alabama, Oklahoma, Arkansas, Ohio, Michigan, Connecticut, Florida, and West Virginia, as well as Canada and Alaska.

Said A. H. Christian, Right of Way Engineer: "The widespread interest in our *Manual* indicates the universal importance felt about the role of the right of way negotiator." Christian said the only contact with the highway department which many a citizen has is that important time when the state needs his property for highway right of way. "This situation is usually distressing to the owner, and the man bringing him the details of the transaction is not exactly a bearer of good tidings. But in spite of this, the right of way negotiator *can* be one of the best cultivators of good will a state highway department has," Christian said. He stated that by skillful attention to the human factors involved, as pointed out in the pages of the *Manual,* the negotiator can win as friends the people he must contact for the department. "Often, it's not the news he brings, but how he brings it," the Right of Way Engineer concluded.

The count in mid-June: Manual Number 909 was on its way.

PETRY STARTS NEW TERM

Associate Justice Zollie Steakley congratulates Herbert C. Petry Jr. after swearing him in to an unprecedented second consecutive term on the Highway Commission. Mrs. Petry stands at her husband's side.

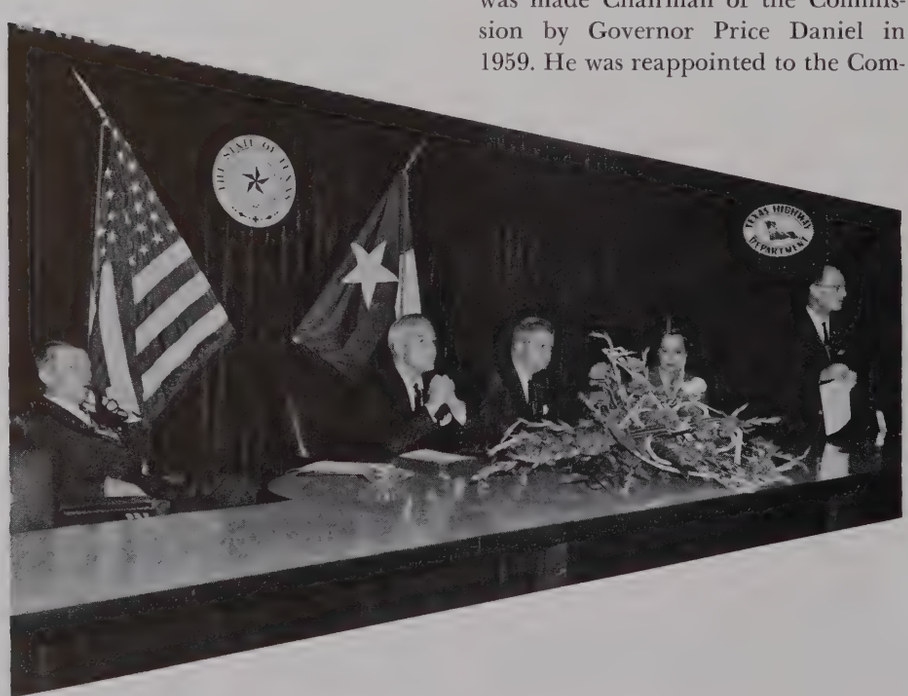
Carrizo Springs lawyer Herbert C. Petry Jr. on May 29 became the first man in the history of the Highway Department to serve two consecutive terms on the Texas Highway Commission.

Petry, named to the Commission in 1955 by then Governor Allan Shivers, was made Chairman of the Commission by Governor Price Daniel in 1959. He was reappointed to the Commission as Chairman by Governor Daniel in March.

Swearing-in ceremonies were held in the Big Hearing Room of the Highway Building on May 29. Zollie Steakley, Associate Justice of the Texas Supreme Court, administered the oath of office.

During Petry's tenure, more mileage was added to the Highway System of Texas than at any other period in the 44-year history of the Department. More than 9,000 miles were added in the past six years.

Petry is the sixteenth Chairman of the Highway Commission. Curtis Hancock was the first, serving as Chairman for less than two years, from June 4, 1917, to March 20, 1919.



Commissioner Charles Hawn acts as Chairman during the swearing-in ceremony for Petry. At left is Hal Woodward; beyond Hawn are Petry, Mrs. Petry, and Judge Steakley.

Petry takes over the Chairmanship of the meeting after the oath of office is administered.

Congratulations are in order for the Petrys. Well-wishers stand by to greet the Commissioner and Mrs. Petry.

State Highway Engineer D. C. Greer presents Petry with an album recording his term of office at a luncheon sponsored by the Texas Good Roads Association.

Petry receives, along with the album, the added congratulations of Greer.

Callan Graham of the Good Roads Association adds a few comments as Petry accepts the album.

OVER THE HIGHWAYS

Comments . . . from the Traveling Public

• This is a note to attempt to show my appreciation for the courtesy and kindness of Mr. Eddie Matthews stationed at your Tourist Information Station on Highway No. 75 north of Denison.

My car stalled over a quarter of a mile south of the Information Station with fuel pump trouble and Mr. Matthews walked with a gallon of water to condense the vapor locking the operation of the fuel pump and got my car started and on the way.

Ed Rowley Jr.
Grapevine, Texas

• Enjoyed roadside parks very much—and having them indicated on a very good map—good roads, and very friendly lady at tourist bureau.

Spokane, Washington

• For some time, we have intended to tell you what a pleasure it is to travel on your wonderful Texas highways. We have decided that we can know, even with our eyes shut, when we cross a state line into Texas.

We have recently bought a small trailer house so we now appreciate not only your good roads, but also your many and beautiful roadside parks.

May we congratulate you, and say it is, indeed, a pleasure to travel in Texas.

Mr. and Mrs. O. H. Johnson
Wellington, Kansas

• Wonderful state—spring flowers on roadsides are beautiful. . . .

Knoxville, Tennessee

• We Texans are so spoiled when it comes to highways—I bless the whole department every time I take a trip which is from here to Lake Louise, and to everywhere else.

I could write a book of "expressions" pulled off in passing along the way. "So wonderful are Texas highways" is the usual comment.

(Mrs.) Claude D. Peake
Clyde, Texas

• Your state has the best highways in the USA by far! (Constructive criticism: Require traffic to keep to the right except when passing—and save many lives.)

Providence, Rhode Island

• . . . I would like three copies of the [Official Highway Travel] map. . . . Are there any other booklets or maps available that I can get also? We have quite a lively interest going on between Alabama and Texas residents after we traced our family history . . . and your map probably shows our distances and facts better than I can try to explain it. . . . From 1872 until about 1890 or so I find the families went on to the western part of the state as the railroads developed. . . . I cannot find any detailed map that includes railroad routes, maybe the one that you have might have them marked. . . . Texas is a good place to study the effects of modern transportation routes as the people are quick to abandon the old and the useless, pioneer blood shows up here more than any other area of the United States. . . . We like good motels and cafes like we find on the better new routes, and have lots of fun without spending very much money. After all my sales talk on Texas to these people in Alabama, I would like to furnish them with a good map to come over to Texas and explore it. . . .

Burnetta Murphree Rogers
Dallas, Texas

• (The following comments were received by Governor Price Daniel, who forwarded them to us.)

We have had the pleasant experience of travelling through your vast state and wish to take this opportunity to express our appreciation for the excellent highways. Would you please express to your staff in the Highway Department our thanks for a grand job—especially on roadside parks.

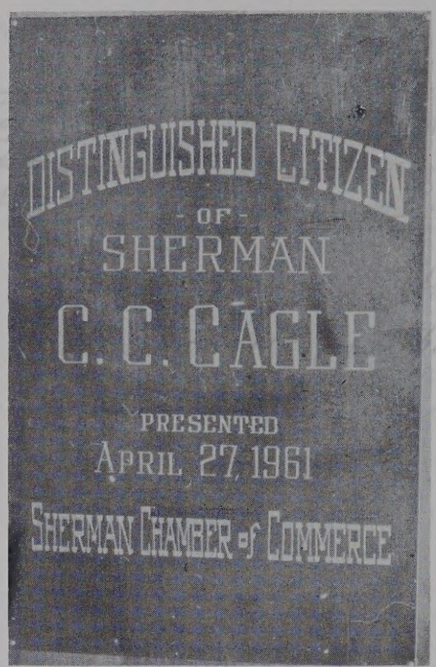
C. C. Crossman
Nashville, Tennessee

• In repairing roads, too many miles were torn up in a stretch. The expressway system is very good.

Camarillo, California

To and From Our Readers

One of four Sherman business and civic leaders honored at the annual Sherman Chamber of Commerce dinner April 27 was C. C. Cagle, Supervising Resident Engineer. Cagle, as well as the other honorees, received an engraved plaque from retiring Chamber president David H. Brown, who said: "He [Cagle] has for years played a major role in building a fine network of roads and highways in the Sherman area. He is a hardheaded, practical engineer who insists on the best, impervious to political pressure, scrupulously honest and completely dedicated to his job."



On March 26, 1961, the Rosenberg Herald Coaster ran a short article on a District 12 employee, which said, "The Texas Highway Patrolmen have a very high regard for Robert Vogler. Whenever there is an accident and Robert hears about it, he is on the scenes directing traffic no matter what the weather.

"See—if we had a hat, we could take it off to Vogler and the other men who voluntarily take their lives in their hands to direct traffic and assist patrolmen in this matter of seeing that there is no bottle-neck at the scene of wrecks."

W. E. Carmichael, District 12 Engineer, explained that Vogler, a Skilled Laborer in the Rosenberg Maintenance Section, has worked with the Department for twelve years. He is one of several employees Bert DeShazo, Senior Maintenance Foreman, has recommended to help the Department of Public Safety when needed. Commented Carmichael, "Mr. Vogler is called frequently and apparently performs his task well."

"HE WAS ONE OF MY BEST MEN TILL HE TRIED TO SIGN THE EXPRESSWAY INTERCHANGE!"

About Our Pictures . . .

For travel solitude, a park road winds lonesomely through Big Bend National Park on our cover this month—in sharp contrast to the divided expressway pictured inside the front cover. This stretch of U. S. 80 lies just west of Big Spring.

Inside the back cover, the scene could be almost anywhere along the roadsides in any state as summer travelers litter America's travelways. Maintenance men follow, clearing the right of way of bottles, cans, candy wrappers, and even watermelon lost by some passing motorist.

TEXAS HIGHWAY COMMISSION

HERBERT C. PETRY JR.	**Chairman**
CHARLES F. HAWN	**Member**
HAL WOODWARD	**Member**
D. C. GREER	**State Highway Engineer**

Texas Highways

TEXAS HIGHWAYS, official journal of the Texas Highway Department, is published in the interest of highway development in Texas and for departmental education in the improvement of construction, maintenance, and operation.

TEXAS HIGHWAYS is available to the general public on a subscription basis at $3.50 annually, or it can be purchased for 35 cents a copy. Subscriptions, inquiries, material, or manuscripts should be directed to the Editorial Office, Travel and Information Division, Texas Highway Department, Austin 14, Texas.

SABINE
RIVER